

**ABSTRACT**

A novel construction board composition is disclosed comprising a unique combination of synthetic binders selected for their ability to establish a strengthened permanent bond in the final dry state for use in a construction board composition comprising primarily gypsum, and in a construction board composition comprising an expanded mineral such as Perlite which largely reduces the amount of gypsum over current gypsum construction board formulations, thus reducing the weight while maintaining the strength of the construction board structure. In a preferred embodiment, the lightweight, strengthened gypsum construction board of the present invention also comprises an optional covering veneer that is applied to provide increased strength, moisture resistance, and fire retardency, and the back paper top ply is treated to provide increased flexural strength. Additionally, this invention relates to the unique manufacturing process to produce the improved gypsum construction board composition of the present invention in order to create a lightweight, strengthened, moisture resistant, and fire retardant construction board used to cover walls in construction applications. Still further, this invention relates to the apparatus for manufacturing the construction board composition of the present invention, including a method and apparatus for economically converting a standard gypsum construction board manufacturing facility into a facility for manufacturing the improved gypsum construction board of the present invention.